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Resting buds as indices of ecological types.—RAUNKIAER[13] has regarded the world of vegetation from a somewhat new view-point, and has developed some ideas that seem of great value. Prevailing ecological classifications have commonly divided vegetation into xerophytic, mesophytic, and hydrophytic groups, in which the foliage organs have been the dominant element. RAUNKIAER thinks that the most rigorous season to which a plant is subjected is the one which should show the most critical ecological structures. Hence he proposes a new classification, based on resting buds and other organs that are most in evidence in rigorous seasons. On this basis five great plant classes are recognized: phanerophytes, whose buds are considerably above the ground (trees and shrubs); chamephytes, whose buds are slightly above the ground; hemicryptophytes, whose buds are at the ground level; cryptophytes, whose buds are hidden in the ground; and therophytes, whose buds persist only in seeds (annuals). The phanerophytes, especially, may be much subdivided: according to size into mega-, meso-, micro-, and nanophanerophytes; according to leaf-fall habit into evergreen and periodically deciduous; according to bud structure into forms with naked or scaly buds. Chamephytes may have stems that are erect in favorable seasons, or stems that are always horizontal. Cryptophytes are divided into geophytes, helophytes (marsh plants), and hydrophytes; geophytes are further subdivided into rhizome, bulb, root-tuber geophytes, etc. The author remarks on the distribution of these various types in relation to soil and climate. It is his idea that the classification of plant formations can be more readily and scientifically accomplished by the recognition of the above types than on other lines. The reviewer feels that the contribution is of great value, and that perhaps RAUNKIAER has given us the most practical classification of vegetation forms we yet have. It seems a pity, however, that the paper is cumbered with so many new terms. For instance, why say therophyte for annual? Too often good ideas are buried under a ponderous Greek or Latin terminology.—HENRY C. COWLES.

Antitoxic value of complete and of incomplete foods.—LE RENARD[14] has undertaken to ascertain how *Penicillium glaucum* can grow in such concentrated solutions of the salts of copper, and also how the resistance of the organism to the toxic salt is modified by varying conditions of nutrition. The maximum concentration of four salts of copper (sulfate, nitrate, chlorid, and acetate) which will allow germination in the presence of complete and incomplete foods has been determined. A complete food contains the eight essential elements according to the empirical formula $C_6H_{12}O_6 + NH_4NO_3 + MgSO_4 + KH_2PO_4 + H_2O$. An incomplete food is one whose corresponding empirical formula is deficient. Fully one-half of the paper is devoted to literature, general biology, and physiology of Penicillium, together with a long discussion of the nature of toxicity.

[13] RAUNKIAER, C., Types biologiques pour la géographie botanique. Bull. Acad. Roy. Sci. Lett. Danemark **1905**:347–437.

[14] LE RENARD, ALF., Essai sur la valeur antitoxique de l'aliment complet et incomplet. 8vo. pp. 1–211. Paris: J. Mersch. 1907.